

### **ABSTRACT OF THE DISCLOSURE**

A method of fabricating BEOL interconnect structures on a  
5 semiconductor device having a plurality of via contacts with low via contact  
resistance is provided. The method includes the steps of: a) forming a  
porous or dense low k dielectric layer on a substrate; b) forming single or  
dual damascene etched openings in the low k dielectric; c) placing the  
substrate in a process chamber on a cold chuck at a temperature about -  
10 200 °C to about 25 °C; d) adding to the process chamber a condensable  
cleaning agent (CCA) to condense a layer of CCA within the etched  
openings on the substrate; and e) performing an activation step while the  
wafer remains cold at a temperature of about -200 °C to about 25 °C. The  
via contacts are very stable during thermal cycles and during operation of  
15 the semiconductor device.